

FUEL CELL SHUTDOWN AND STARTUP  
USING A CATHODE RECYCLE LOOP

ABSTRACT OF THE DISCLOSURE

A method and device for operating a fuel cell system. A recirculation loop coupled to a fuel cell cathode ensures that fluids passing 5 through the cathode are recycled, thereby enabling reaction between residual oxygen in the recycled fluid and fuel that has been introduced into the recirculation loop until substantially all of the oxygen is reacted, leaving a substantially oxygen-free, predominantly nitrogen compound in the cathode and related flowpath. Thereafter, this compound can be redirected to purge 10 the remaining residual hydrogen resident in the fuel cell's anode and related flowpath. While the present invention is usable during any period of system operation, it is especially valuable for operational conditions associated with starting up and shutting down a fuel cell system to inhibit the formation of high voltage potentials that could otherwise damage fuel cell catalysts or 15 catalysts supports.